* NOTICES *

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EFFECT OF THE INVENTION

[Effect of the Invention] It becomes possible to offer the conductive roller which can reduce effectively the odor generated in the case of conductive roller manufacture by this invention.

[Translation done.]

PATENT ABSTRACTS OF JAPAN

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(54) CONDUCTIVE ROLLER

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a conductive roller for which the odors generated in manufacturing of it can be effectively decreased.
SOLUTION: The conductive roller is manufactured by using a composition consisting of an oxyakylene-base polymer having at least one hydrosilylation reactable alkenyl group in the molecule, a compound having at least two hydrosilyl groups in the molecule, a hydrosilylating catalyst, a conductivity imparting agent and a compound having at least one acid anhydride unit in the molecule.

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CLAIMS

[Claim(s)]
[Claim 1] The conductive roller which comes to form the conductive rubber elastic layer which is made to harden the constituent constituted considering following component (A) - (E) as an indispensable component around a conductive shaft, and is obtained.
(A) The compound which contains at least one acid-anhydride unit in (Compound C) hydrosilylation (catalyst D) (electro-conductivity applying agent E) molecule which has at least two hydrosilyl radicals in the oxy-alkylene system (polymer B) molecule which has in a molecule the alkenyl radical in which at least one hydrosilylation reaction is possible [claim 2] (A) The conductive roller according to claim 1 which the alkenyl radical in which a hydrosilylation reaction is possible comes to contain at the molecule end among the polymer of a component.
[Claim 3] (A) The conductive roller according to claim 1 or 2 whose number average molecular weight of the polymer of a component is within the limits of 1000-50000.
[Claim 4] (A) A conductive roller given in any 1 term of claims 1-3 whose components are the oxypropylene system polymers which have in a molecule the alkenyl radical in which at least one hydrosilylation reaction is possible.
[Claim 5] (B) A conductive roller given in any 1 term of claims 1-4 which are the polyorgano hydrogen siloxanes to which the compound which has a hydrosilyl radical in the molecule of a component contains at least two hydrosilyl radicals in 1 molecule on the average.
[Claim 6] (D) A conductive roller given in any 1 term of claims 1-5 characterized by the electro-conductivity applying agent of a component being carbon black.
[Claim 7] (E) A conductive roller given in any 1 term of claims 1-6 characterized by the number average molecular weight of a component being 2000 or more.
[Claim 8] (E) A conductive roller given in any 1 term of claims 1-7 to which a component is characterized by being a maleic-anhydride-isobutylene system copolymer and/or a maleic-anhydride-allyl compound end polyoxyalkylene series copolymer.
[Claim 9] The conductive roller characterized by forming the enveloping layer of a monolayer or a double layer in the outside of this conductive rubber elastic layer of a conductive roller given in any 1 term of claims 1-8.
[Claim 10] The conductive roller according to claim 9 with which the resin constituent which constitutes an enveloping layer is characterized by being a urethane resin constituent.
[Claim 11] The conductive roller according to claim 9 or 10 characterized by forming an enveloping layer with a thickness of 1-100 micrometers, and being obtained from on a conductive rubber elastic layer by applying the solution of the resin constituent which constitutes an enveloping layer, and making it dry at the temperature of 70-200 degrees C.
[Claim 12] The conductive roller according to claim 11 characterized by the solvent of the solution of the resin constituent which constitutes an enveloping layer being what contains N.N-dimethylformamide and/or N,N-dimethylacetamide a total of 10% of the weight or more.

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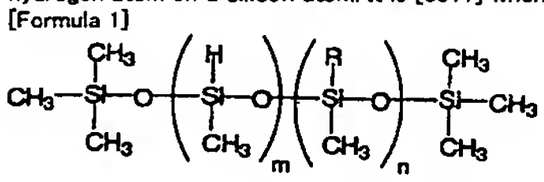
DETAILED DESCRIPTION

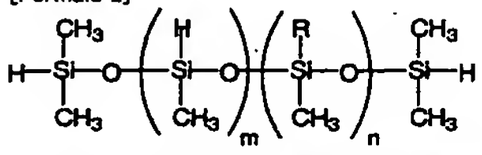
[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a conductive roller. It is related with conductive rollers, such as the electrification roller built into the image recording equipment which adopted in more detail electrophotography methods, such as a laser beam printer, facsimile, and OA equipment that compounded these, a developing roller, an imprint roller, a middle imprint drum, a feed roller, a cleaning roller, and a pressurization roller for fixing.
[0002]
[Description of the Prior Art] The conductive roller which comes to form the conductive rubber elastic layer which adds an electro-conductivity applying agent to the hydrosilylation addition mold-curing nature constituent which uses an oxy-alkylene system polymer as a principal component, is made to harden this around a conductive shaft, and is obtained, and the conductive roller with which it comes to form the enveloping layer of a monolayer or a double layer in the outside of this conductive rubber elastic layer are already well-known (JP,7-300564,A, JP,9-96944,A, JP,9-292754,A, JP,2000-119507,A, etc.). Although the enveloping layer formed in the outside of said conductive rubber elastic layer is formed using the methods of application, such as dipping and a spray, various resin constituents The odor by the matter generated by the solvent used in case this enveloping layer is prepared sinking into a conductive rubber elastic layer, and a minute amount's remaining and causing a certain chemical change also even for after desiccation with heating at the time of this solvent or this solvent being desiccation etc. might become a problem. Concretely, although N,N-dimethylformamide or N,N-dimethylacetamide was used as a suitable solvent in the urethane resin constituent preferably used as a constituent of an enveloping layer, when especially this solvent was used, the odor after desiccation often became a problem.
[0003]
[Problem(s) to be Solved by the Invention] This invention is made in view of this actual condition, and offers the conductive roller which can reduce effectively the odor generated in the case of conductive roller manufacture.
[0004]
[Means for Solving the Problem] The oxy-alkylene system polymer which has in a molecule the alkenyl radical in which at least one hydrosilylation reaction is possible as a result of repeating research wholeheartedly that this invention person should solve the above-mentioned technical problem, The compound, hydrosilylation catalyst which have at least two hydrosilyl radicals in a molecule, By manufacturing the conductive roller which has the conductive rubber elastic layer which is made to harden the constituent which uses as an indispensable component an electro-conductivity applying agent and the compound which contains at least one acid-anhydride unit in a molecule around a conductive shaft, and is obtained It came to make a header and this invention for the above-mentioned technical problem being solvable.
[0005] Namely, the oxy-alkylene system polymer which has the alkenyl radical in which at least one hydrosilylation reaction of this invention is possible in the (A) molecule, (B) The compound, (C) hydrosilylation catalyst which have at least two hydrosilyl radicals in a molecule, (D) It is related with the conductive roller which comes to form the conductive rubber elastic layer which is made to harden the constituent which uses as an indispensable component the compound which contains at least one acid-anhydride unit in an electro-conductivity applying agent and the (E) molecule around a conductive shaft, and is obtained.
[0006] The thing which the alkenyl radical in which a hydrosilylation reaction is possible comes to contain at the molecule end as a polymer of the aforementioned (A) component is desirable, as for the number average molecular weight of the polymer of the (A) component, it is desirable that it is within the limits of 1000-50000, and its oxypropylene system polymer which has in a molecule the alkenyl radical in which at least one hydrosilylation reaction is possible as a (A) component is desirable.

[0007] The polyorgano hydrogen siloxane which contains at least two hydrosilyl radicals in 1 molecule on the average as a compound which has a hydrosilyl radical in the molecule of the aforementioned (B) component is desirable.
[0008] As an electro-conductivity applying agent of the aforementioned (D) component, carbon black is used suitably. Into the molecule of the aforementioned (E) component, as a compound containing at least one acid-anhydride unit, it is desirable that number average molecular weight is 2000 or more, and a maleic-anhydride-isobutylene system copolymer and/or a maleic-anhydride-allyl compound end polyoxyalkylene series copolymer can be used suitably.
[0009] In the conductive roller manufactured in this invention, the enveloping layer of a monolayer or a double layer may be prepared in the outside of this conductive rubber elastic layer, and a urethane resin system constituent can be suitably used as a resin constituent which constitutes an enveloping layer. Said enveloping layer can be prepared by applying the solution of the resin constituent which constitutes an enveloping layer from on a conductive rubber elastic layer. As for the temperature at the time of drying the applied resin constituent solution, it is desirable that it is 70-200 degrees C. Moreover, as for the thickness of the enveloping layer obtained after desiccation, it is desirable that it is 1-100 micrometers. Moreover, it is desirable that the solvent of the solution of the resin constituent which constitutes an enveloping layer is what contains N,N-dimethylformamide and/or N,N-dimethylacetamide a total of 10% of the weight or more.
[0010]
[Embodiment of the Invention] The (A) component used for this invention is an oxy-alkylene system polymer which has in a molecule the alkenyl radical in which at least one hydrosilylation reaction is possible.
[0011] Here, it will not be restricted especially if an alkenyl radical is a radical including carbon-carbon duplex association which has activity to a hydrosilylation reaction. As an alkenyl radical, ring type unsaturated hydrocarbon radicals, such as aliphatic series partial saturation hydrocarbon groups, such as a vinyl group, an allyl group, a methylvinyl radical, a propenyl radical, a butenyl group, a pentenyl radical, and a hexenyl radical, a cyclo propenyl radical, a cyclo butenyl group, a cyclo pentenyl radical, and a cyclohexenyl group, an methacrylic radical, etc. are mentioned. (A) Although the number of the alkenyl radicals of the oxy-alkylene system polymer of a component is required in order [at least one] to carry out a hydrosilylation reaction with the (B) component which is a curing agent, in the case of the molecule which has two alkenyl radicals in the both ends of a molecule from a viewpoint which obtains good rubber elasticity in the case of a straight chain molecule, and has branching, it is desirable to have two or more alkenyl radicals at the molecule end. As for the (A) component in this invention, it is desirable to introduce into the polymer end the alkenyl radical in which the above-mentioned hydrosilylation reaction is possible. Thus, when an alkenyl radical is in a polymer end, it is desirable from points, like the roller which has the rubber elastic layer of a low degree of hardness and high intensity becomes is easy to be obtained.
[0012] Here, although the approach of introducing an alkenyl radical into an end, a principal chain, or a side chai by making the organic compound which has the active group and alkenyl radical which show reactivity to an end a principal chain, or a side chain to the above-mentioned functional group as an approach of introducing an alkenyl radical into a polymer at the organic polymer which has functional groups, such as a hydroxyl group and an alkoxide radical, for example react is mentioned, it is not necessarily limited to this, moreover, as an example of the organic compound which has the active group and alkenyl radical which show reactivity to the above-mentioned functional group The unsaturated fatty acid of C3-C20, such as an acrylic acid, a methacrylic acid, a vinyl acetic acid, acrylic-acid chloride, and an acrylic-acid star's picture, Acid halide, an acid anhydride, etc. anc allyl compound chloro formate ($CH_2=CHCH_2OCOCl$), The unsaturated fatty acid permutation carbonic acid halide of C3-C20, such as allyl compound BUROMO formate ($CH_2=CHCH_2OCOBr$), An allyl chloride, an allyl compound star's picture, vinyl (chloro methyl) benzene, Allyl compound (chloro methyl) benzene, allyl compound (bromomethyl) benzene, The allyl compound (chloro methyl) ether, allyl compound (chloro methoxy) benzene, 1-butenyl (chloro methyl) ether, 1-hexenyl (chloro methoxy) benzene, allyloxy (chloro methyl) benzene, etc. are mentioned.
[0013] As a unit which 50% or more says the polymer which consists of an oxy-alkylene unit, and contains in addition to an oxy-alkylene unit, the unit from the compound which is used as starting material at the time of polymer manufacture and which has two or more active hydrogen, for example, ethylene glycol, a bisphenol system compound, a glycerol, trimethylol propane, pentaerythritol, etc. is mentioned preferably 30% or more of the unit from which the oxy-alkylene system polymer in this invention constitutes a principal chain. In this invention, an oxypropylene system polymer is especially mentioned as a desirable polymer from the point of availability etc. In addition, you may be a copolymer (a graft polymer is also included) with the unit which consists of ethylene oxide, butylene oxide, etc. in the case of an oxypropylene system polymer.
[0014] As molecular weight of the oxy-alkylene system polymer of the above (A) components, it is desirable tha

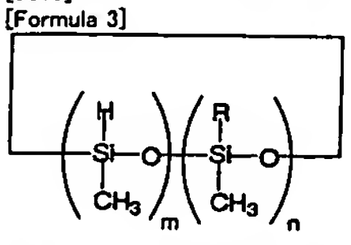
it is 5000-30000 at 1000-50000, and a pan in the viewpoint received the balance of reactivity and the reduction in a degree of hardness to number average molecular weight (Mn). When number average molecular weight is less than 1000, and this hardenability constituent is stiffened, sufficient mechanical property (a rubber degree of hardness, elongation percentage) etc. becomes is hard to be acquired. It is in the inclination for hardening to become inadequate in many cases in order that the molecular weight per alkenyl radical contained in a molecule when number average molecular weight becomes not much large on the other hand too much may become large or reactivity may fall by steric hindrance, and for viscosity to become high too much, and for workability to worsen. The number average molecular weight in this invention can usually be obtained as a polystyrene reduced property by GPC measurement by the polystyrene gel column which used chloroform as a mobile phase.
[0015] If the (B) component in this invention is used as a curing agent and contains two or more hydrosilyl radicals in intramolecular, there will be no limit. Here, in this invention, although the radical which has Si-H association is expressed as a hydrosilyl radical, when two hydrogen atoms (H) have combined with the same silicon atom (Si), it calculates with two hydrosilyl radicals.
[0016] (B) As a component, although a polyorgano hydrogen siloxane is desirable, it is mentioned as one. The polyorgano hydrogen siloxane said here points out the siloxane compound which has a hydrocarbon group or a hydrogen atom on a silicon atom. It is [0017] when the structure is shown concretely.
[Formula 1]



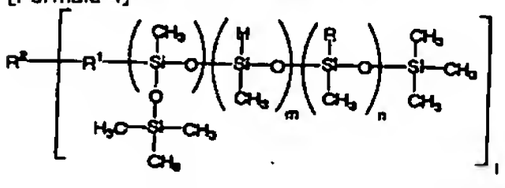
(As 2<m+n<=50, 2<m, 0<=n, and R, the carbon number of a principal chain may contain one or more phenyl groups with the hydrocarbon of 2-20.)
[0018]
[Formula 2]



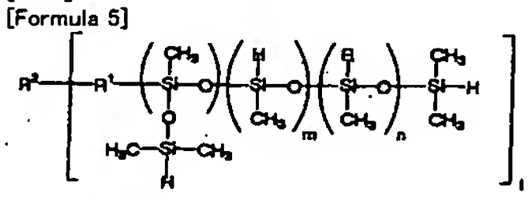
(As 0<m+n<=50, 0<m, 0<=n, and R, the carbon number of a principal chain may contain one or more phenyl groups with the hydrocarbon of 2-20.)
[0019]
[Formula 3]



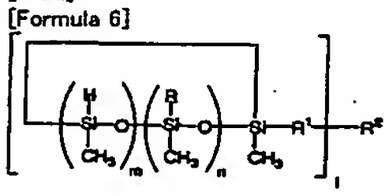
(As 3 <=m+n<=20, 2< m<=19, 0<=n<18, and R, the carbon number of a principal chain may contain one or more phenyl groups with the hydrocarbon of 2-20.) etc. -- the shape of a chain shown, an annular thing, and [0020] that has these two or more units
[Formula 4]



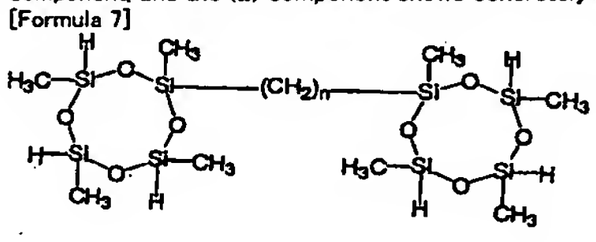
(As 1 <=m+n<=50, 1<=m, 0<=n, and R, the carbon number of a principal chain may contain one or more phenyl groups with the hydrocarbon of 2-20.) 2<=l and R2 are the organic radicals of 2 - tetravalence, and R1 is a divalent organic radical. However, R1 may not be depending on the structure of R2.
[0021]
[Formula 5]



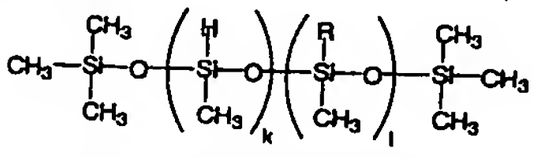
(As 0 <=m+n<=50, 0<=m, 0<=n, and R, the carbon number of a principal chain may contain one or more phenyl groups with the hydrocarbon of 2-20.) 2<=l and R2 are the organic radicals of 2 - tetravalence, and R1 is a divalent organic radical. However, R1 may not be depending on the structure of R2.
[0022]
[Formula 6]



(As 3 <=m+n<=50, 1<=m, 0<=n, and R, the carbon number of a principal chain may contain one or more phenyl groups with the hydrocarbon of 2-20.) 2<=l and R2 are the organic radicals of 2 - tetravalence, and R1 is a divalent organic radical. however, R1 may not be depending on the structure of R2. etc. -- what is shown is mentioned.
[0023] Moreover, if in charge of use of these (B) components, what has good compatibility with the (A) component, the (C) component, the (D) component, and the (E) component or the distributed stability in a system is desirable. When especially the viscosity of the whole system is low and what has compatibility low as (B) component with each above-mentioned component is used, phase separation happens and poor hardening may be caused.
[0024] (A) It is [0025] when compatibility or distributed stability with a component, the (C) component, the (D) component, and the (E) component shows concretely as a comparatively good thing.
[Formula 7]



(n is 6-12)
[0026]
[Formula 8]



(2< k<30, 0< l<10, and R are a with a carbon numbers of eight or more hydrocarbon group) etc. -- it is mentioned.
[0027] Moreover, it is desirable to use it to the total amount of the alkenyl radical of the (A) component, as

amount of the (B) component used in this invention, so that the hydrosilyl radical of the (B) component may become 0.8-5.0Eq. It may become inadequate constructing a bridge, when the hydrosilyl radical of the (B) component does not fulfill 0.8Eq to the alkenyl radical total amount of the above-mentioned (A) component. Moreover, in exceeding 5.0Eq, it poses a problem that physical properties change with the effects of the hydrosilyl radical which remains after hardening a lot. It is desirable to use the (B) component so that it may become 0.9-2.0Eq to control especially this effect.

[0028] About the hydrosilylation catalyst which is the (C) component of this invention, there is especially no limit and it can use the thing of arbitration, the thing; platinum-vinyl siloxane complex which made support, such as chloroplatinic acid, a simple substance of platinum, an alumina, a silica, and carbon black, support solid-state platinum when illustrating concretely — [— for example Ptn(ViMe2SiOSiMe2Vi) n and a Pt[(MeViSiO)4] m]; platinum-phosphine complex — [— for example a Pt (PPh3)4 and Pt(PBu3)4]; platinum-phosphite complex — [— for example Pt[P(OPh)3] 4 and Pt[P(OBu) 3]4] (the inside of a formula, and Me — a methyl group —) In Bu, butyl and Vi express a vinyl group, Ph expresses a phenyl group, and n and m express an integer. The platinum alcoholate catalyst indicated in Lamoreaux's and others U.S. Pat. No. 3220972 specification is also mentioned to the platinum-hydrocarbon complex indicated in Pt (acac)2, Ashby's and others United States patent 3159601st, and a No. 3159662 specification, and a list.

[0029] Moreover, as an example of catalysts other than a platinum compound, RhCl (PPh3)3, RhCl3, Rh/aluminum 2O3, RuCl3, IrCl3, FeCl3 and AlCl3, PdCl2.2H2O, NiCl2, TiCl4, etc. are mentioned. These catalysts may be used independently, and even if it uses two or more sorts together, they are not cared about. Chloroplatinic acid, a platinum-olefin complex, a platinum-vinyl siloxane complex, and Pt(acac)2 grade are desirable from the point of catalytic activity.

[0030] (C) Although there is especially no limit as an amount of catalysts of a component, it is good to use in the range of 10-1 to ten to 8 mol to one mol of alkenyl radicals in the (A) component. It is good to use in the range of 10-2 to ten to 6 mol preferably. Moreover, it is better not to use ten - one or more mols, since a hydrosilylation catalyst is generally expensive, and it is corrosive, and hydrogen gas is generated in large quantities and a hardened material may foam.

[0031] The electro-conductivity applying agent which is the (D) component in this invention is a component which gives conductivity to the roller manufactured using the constituent of this invention, or the constituent of this invention. As an electro-conductivity applying agent of a component, (D) Carbon black, a metallic oxide, Metal impalpable powder, an alkali-metal salt, quarternary ammonium salt, a carboxylic-acid radical, The organic compound or polymer which has a sulfonic group, a sulfate radical, a phosphoric ester radical, etc., Ether ester imide or an ether imide polymer, an ethyleneoxide-epihalohydrin copolymer, Compounds, such as an antistatic agent of high molecular compounds, such as a compound which has the conductive unit represented with methoxy polyethylene-glycol acrylate etc., or a polyethylene-glycol derivative, etc. are mentioned.

[0032] As an example of the above-mentioned carbon black, furnace black, acetylene black, lamp black, channel black, thermal black, oil black, etc. are mentioned. There is no limit in the class of these carbon black, particle size, etc.

[0033] Here, since a hydrosilylation reaction may be checked depending on the class and addition of an electro-conductivity applying agent, it is desirable that the effect to a hydrosilylation reaction uses few electro-conductivity applying agents. (D) the addition of a component is adjusted and added according to a desired electric conduction property (roller resistance) — having — the polymer 100 weight section of the (A) component -- receiving -- further 5 - **** for the 1 - 100 weight section and 50 weight sections — things are desirable. When the electric conduction grant ability which will be obtained if there are too few additions is inadequate and there are too many additions, there is a possibility that it may become large bad going up [of viscosity] workability. Here, the roller resistance in this invention applies a roller at a level with a metal plate, and adds a 500g load to each of the both ends of the conductive shaft of a roller in the direction of a metal plate, and the electric resistance value measured by impressing the direct current voltage of 10-100 volts between a shaft and a metal plate is said.

[0034] In case the compound which has at least one acid-anhydride unit in the molecule which is the (E) component of this invention forms the enveloping layer of the conductive roller manufactured by this invention, it is a component for reducing the often generated odor. When the N,N-dimethylformamide used as a suitable solvent of the urethane resin preferably used as a principal component of an enveloping layer concretely [the odor considered to be based on the solvent reason used as above-mentioned when forming an enveloping layer may become a problem, and] was used, the odor after desiccation often became a problem. As a cause of this odor, although it is not clear for details, after desiccation is considered to be based on the amine system compound which it is decomposed or returned and the solvent which remains in the minute amount, or a solvent generates under the effect of heat etc. In this invention, it is thought that an acid anhydride supplements with

said amine compound etc. effectively.

[0035] As a (E) component of this invention, if at least one acid-anhydride unit is contained in a molecule, there is especially no limit and it can use the usual organic compound or a polymer. In this invention, a maleic-anhydride and maleic-anhydride-isobutylene system copolymer, a maleic-anhydride-styrene system copolymer, a maleic-anhydride-allyl compound end polyoxyalkylene series copolymer, phthalic anhydride, methyl cyclohexene-dicarboxylic anhydride, hexahydro phthalic anhydride, the Pori adipic-acid anhydride, tetrahydro phthalic anhydride, and ethylene glycol bis(trimellitate) are illustrated. Especially, it is liquefied, and is easy to handle, and compatibility with the (A) component which is matrix resin can use suitably a maleic-anhydride-isobutylene system copolymer and a maleic-anhydride-allyl compound end polyoxyalkylene series copolymer from a good point. (E) As for the molecular weight of a component, it is desirable that it is 2000 or more. (E) The addition of a component has desirable 0.01 - 50 weight section to the (A) component 100 weight section, and its 0.1 - 20 weight section is still more desirable. When there are too few additions, there is a possibility that sufficient effectiveness may no longer be acquired. Moreover, when there are too many additions, there is a possibility that the acid-anhydride part the part carried out [the part] ring breakage may become causes, such as foaming at the time of hardening.

[0036] In this invention, it is adding the (E) component, and in reducing the odor generated in case the enveloping layer of the conductive rubber elastic layer formed from (A) - (E) component of a conductive roller is formed and using nitrogen-containing atom system solvents, such as N,N-dimethylformamide, as a solvent of an enveloping layer especially, it discovers the very big odor reduction effectiveness.

[0037] Moreover, to the constituent of this invention, the adhesive grant agent for raising the adhesive property over various base materials and adhesive grant resin can be added if needed. As an example of an adhesive grant agent, various silane coupling agents, an epoxy resin, etc. are mentioned. The effect of especially the silan coupling agent that has functional groups, such as an epoxy group, a methacryloyl radical, and a vinyl group, affect the hardenability of a constituent is also small, and it is easy to use effectiveness also for an adhesive manifestation greatly. However, the silane coupling agent which can be used is not limited to these. Moreover, it can use together with a silane coupling agent or an epoxy resin, and these reaction catalysts can be added. Moreover, there is especially no limitation in adhesive grant resin, and it can usually use what is used as a tackifier for it. As an example, phenol resin, denaturation phenol resin, cyclopentadiene-phenol resin, xylene resin, cumarone resin, petroleum resin, terpene resin, terpene phenol resin, rosin ester resin, etc. are mentioned In addition, if in charge of these use, the effect to a hydrosilylation reaction must be taken into consideration. Moreover, to the constituent of this invention, an antioxidant, an ultraviolet ray absorbent, a pigment, etc. may be added suitably.

[0038] Moreover, a storage stability amelioration agent can be used for the constituent of this invention in order to improve storage stability. It is not limited especially that to be the usual stabilizer known as a preservation stabilizer of the (B) component of this invention as this storage stability amelioration agent, and what is necessary is just what attains the desired end. Specifically, the compound containing an aliphatic series unsaturated bond, an organic phosphorous compound, an organosulfur compound, a nitrogen content compound, a tin system compound, organic peroxide, etc. can be used suitably. Still more specifically 2-benzothiazolyl sulfide, benzothiazole, A thiazole, dimethyl acetylene die carboxylate, diethyl acetylene die carboxylate, Butylhydroxytoluene, burylhydroxyanisole, vitamin E, 2-(4-mol FOJI nil dithio) benzothiazole, 3-methyl-1-butene-3-oar, An acetylene nature partial saturation radical content ORGANO siloxane, an ethylene nature partial saturation radical content ORGANO siloxane, Although acetylene alcohol, 3-methyl-1-butyl-3-oar, diallyl fumarate, diallyl malete, diethylfumarate, diethyl malate, dimethylmalate, 2-pentene nitril, 2, and 3-dichloropropene etc. is mentioned It is not necessarily limited to these.

[0039] Especially the manufacture approach of the conductive roller in this invention is not limited, but the shaping approach of various well-known rollers can be conventionally used for it. For example, a constituent is fabricated to the metal mold which installed metal shafts, such as a product made from SUS, in the core by the various fabricating methods, such as extrusion molding, press forming, injection molding, reaction injection molding, liquefied injection molding, and cast molding, heat hardening is carried out to it by suitable temperature and time amount, and a conductive rubber elastic layer is formed in the surroundings of a conductive shaft. Here as a conductive shaft in this invention, the thing of a sleeve configuration in the air can also be used. Since the constituent for forming an elastic layer is liquefied as the manufacture approach of the conductive roller in this invention, liquefied injection molding is desirable in respect of productivity and workability. In this case, after carrying out semi-hardening of the conductive constituent, it may establish and carry out full hardening of the process which carries out postcure separately.

[0040] The constituent of this invention is hardened by the addition reaction of the Si-H radical to the alkenyl radical which used the precious metal catalyst. Therefore, a cure rate is very quick, and it is convenient when

performing Rhine production. The temperature to which heat curing of the constituent of this invention is carried out has desirable within the limits of 80 degrees C - 180 degrees C. If it becomes 80 degrees C or more, a hydrosilylation reaction can advance rapidly and it can be made to harden by short time amount.

[0041] Next, the enveloping layer prepared in the outside of the conductive rubber elastic layer of the conductive roller in this invention is explained.

[0042] As a concrete resin constituent of an enveloping layer, although there is especially no limit, a urethane bond is contained from a viewpoint of an electric conduction property and abrasion resistance. From viewpoints, such as flexibility, that what is necessary is just to consist of a urethane resin constituent which considers a polyether, polyester, and the resin that has a polycarbonate frame as the main presentations Moreover, urethane resin, You may be a urethane resin constituent containing at least one frame chosen in the group which consists of a urethane bond, a polyether, polyester, a polycarbonate, and a polysiloxane into a polyether, polyester, blend resin with a polycarbonate, and 1 molecule. Moreover, to the resin constituent which constitutes an enveloping layer, an electro-conductivity applying agent, various fillers, or the various additives of a silane coupling agent may be added if needed from viewpoints, such as an adhesive property over resistance adjustment, surface type-like adjustment, or a conductive elastic layer.

[0043] Next, the formation approach of the enveloping layer in this invention is explained. Although there is especially no limit as the formation approach of the enveloping layer in this invention, the enveloping layer of this conductive rubber elastic layer can be formed by applying to predetermined thickness the resin constituent which constitutes an enveloping layer using the approach of a spray coating cloth, DIP spreading, a roll coat, etc., and making it dry and harden at predetermined temperature from on a conductive rubber elastic layer. The resin used as the above-mentioned enveloping layer is specifically melted to a solvent, solid content is made 5 - 20%, and a spray or the approach of carrying out dipping spreading is simple. If the resin which is the principal component of an enveloping layer used as a solvent to be used dissolves, there will be especially no limit and, specifically, a methyl ethyl ketone, butyl acetate, ethyl acetate, N,N-dimethylformamide, N,N-dimethylacetamide, toluene, etc. will be illustrated. When forming an enveloping layer especially using urethane resin, N,N-dimethylformamide and N,N-dimethylacetamide are desirable from a viewpoint of compatibility.

[0044] Under the present circumstances, in order to improve the coat nature of an enveloping layer solution, various additives, such as a leveling agent, may be added if needed. The conductive roller in this invention may prepare an unit or two or more enveloping layers in the outside of a conductive rubber elastic layer if needed. The conductive roller of this invention is suitable for the concrete for example, electrification roller for electrophotography equipments, a developing roller, an imprint roller, a middle imprint drum, a feed roller, a cleaning roller, the pressurization roller for fixing, etc.

[0045]

[Example] Although this invention is further explained to a detail based on the following examples, this invention is not limited only to these examples.

Stinking thing quality evaluation: Qualitative evaluation of stinking thing existence was performed about what put the created roller into the plastics bag of 320mmx400mm, and left it at the room temperature with the nitrogen of 3L for 24 hours, and what O and an odor are sensed as in what an odor is not sensed as was estimated as x.

Smell evaluation by the stinking sensor: It evaluated using stinking sensor XP-329N (product made from new cosmos electrical machinery) about what put the created roller into the plastics bag of 320mmx400mm, and left it at the room temperature with the nitrogen of 3L for 24 hours.

As opposed to allyl compound end polyoxypropylene (trade name ACX004-N, Kaneka make) 500g as a (A) component (Example 1) (D) Into the mixture kneaded with 3 rolls as a component, carbon black #3030B (Mitsubishi Chemical make)70g subsequently (E) As a component a maleic-anhydride-allyl compound end polyoxyalkylene series copolymer (made in [Nippon Oil & Fats] trade name Maria Lim AKM0531) 5g, (B) As a component a polyorgano hydrogen siloxane (trade name ACX004-C, Kaneka make) as 33g and a (C) component As 350microL and a storage stability amelioration agent, 170microL **** of the dimethylmalate was carried out, and homogeneity mixing of the bis(1, 3-divinyl - 1, 1, 3, and 3-tetramethyl disiloxane) platinum complex compound catalyst (platinum content 3wt% and xylene solution) was carried out. The conductive constituent obtained in this constituent after vacuum degassing churning equipment (product made from C Tech) performed the indirect desulfurization bubble for 90 minutes was poured into the roller molding die by injection pressure 1MPa, and ten semi-conductive rollers which prepared the semi-conductive elastic layer with 3mm [in thickness] and a die length of 230mm in the surroundings of the shaft with a diameter of 8mm made from SUS on the conditions of 20-minute heating by 150 degrees C were created.

[0046] Next, how to create an enveloping layer about the created roller is described. It dissolves in 450g (N,N-dimethylformamide) of solvents, and applies by the dipping method, and at 150 degrees C, 50g (trade name high MUREN Y237) of polyether system urethane resin was heated for 60 minutes, and it was dried. Thus, the result

of having performed the above-mentioned smell evaluation about the created roller was shown in Table 1.

(Example 2) About the formula of example 1 publication, the rest created the roller similarly, having used the maleic-anhydride-allyl compound end polyoxyalkylene series copolymer (made in [Nippon Oil & Fats] trade name Maria Lim AFB1521) as a (E) component, and having used the addition as 10g. Furthermore, the result of having formed the enveloping layer by the approach of example 1 publication similarly, and having performed the above-mentioned smell evaluation about the obtained roller was shown in Table 1.

(Example 3) About the formula of example 1 publication, the rest created the roller similarly, having used the maleic-anhydride-allyl compound end polyoxyalkylene series copolymer (made in [Nippon Oil & Fats] trade name Maria Lim AAB0851) as a (E) component, and having used the addition as 10g. Furthermore, the result of having formed the enveloping layer by the approach of example 1 publication similarly, and having performed the above-mentioned smell evaluation about the obtained roller was shown in Table 1.

(Example of a comparison) About the conductive roller given in an example, the rest added the conductive roller by the same approach, without adding the (E) component. Still the more nearly same, by the approach of example 1 publication, the clothing layer was formed and the result of having performed the above-mentioned smell evaluation about the obtained roller was shown in Table 1.

[0047]

[Table 1]

	実施例1	実施例2	実施例3	比較例
定性試験	○	○	○	×
臭いセンサー測定値	187	133	191	360

As shown above, in case the enveloping layer of a conductive roller is formed, according to this invention, it becomes possible to reduce the often generated odor.

[0048]

[Effect of the Invention] It becomes possible to offer the conductive roller which can reduce effectively the odor generated in the case of conductive roller manufacture by this invention.

[Translation done.]

TECHNICAL FIELD

[Field of the Invention] This invention relates to a conductive roller. It is related with conductive rollers, such as the electrification roller built into the image recording equipment which adopted in more detail electrophotography methods, such as a laser beam printer, facsimile, and OA equipment that compounded these, a developing roller, an imprint roller, a middle imprint drum, a feed roller, a cleaning roller, and a pressurization roller for fixing.

[Translation done.]

PRIOR ART

[Description of the Prior Art] The conductive roller which comes to form the conductive rubber elastic layer which adds an electro-conductivity applying agent to the hydrosilylation addition mold-curing nature constituen which uses an oxy-alkylene system polymer as a principal component, is made to harden this around a conductive shaft, and is obtained, and the conductive roller with which it comes to form the enveloping layer of monolayer or a double layer in the outside of this conductive rubber elastic layer are already well-known (JP,7-300564,A, JP,9-96944,A, JP,9-292754,A, JP,2000-119507,A, etc.). Although the enveloping layer formed in the outside of said conductive rubber elastic layer is formed using the methods of application, such as dipping and s spray, various resin constituents The odor by the matter generated by the solvent used in case this enveloping layer is prepared sinking into a conductive rubber elastic layer, and a minute amount's remaining and causing a certain chemical change also even for after desiccation with heating at the time of this solvent or this solvent being desiccation etc. might become a problem. Concretely, although N,N-dimethylformamide or N,N-dimethylacetamide was used as a suitable solvent in the urethane resin constituent preferably used as a constituent of an enveloping layer, when especially this solvent was used, the odor after desiccation often became a problem.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] It becomes possible to offer the conductive roller which can reduce effectively the odor generated in the case of conductive roller manufacture by this invention.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] This invention is made in view of this actual condition, and offers the conductive roller which can reduce effectively the odor generated in the case of conductive roller manufacture.

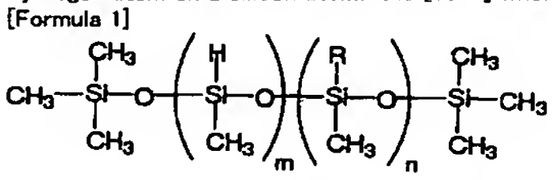
[Translation done.]

* NOTICES *

MEANS

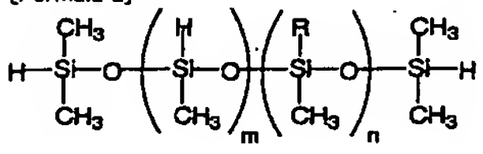
[Means for Solving the Problem] The oxy-alkylene system polymer which has in a molecule the alkenyl radical in which at least one hydrosilylation reaction is possible as a result of repeating research wholeheartedly that this invention person should solve the above-mentioned technical problem, The compound, hydrosilylation catalyst which have at least two hydrosilyl radicals in a molecule, By manufacturing the conductive roller which has the conductive rubber elastic layer which is made to harden the constituent which uses as an indispensable component an electro-conductivity applying agent and the compound which contains at least one acid-anhydride unit in a molecule around a conductive shaft, and is obtained It came to make a header and this invention for the above-mentioned technical problem being solvable.
[0005] Namely, the oxy-alkylene system polymer which has the alkenyl radical in which at least one hydrosilylation reaction of this invention is possible in the (A) molecule, (B) The compound, (C) hydrosilylation catalyst which have at least two hydrosilyl radicals in a molecule, (D) It is related with the conductive roller which comes to form the conductive rubber elastic layer which is made to harden the constituent which uses as an indispensable component the compound which contains at least one acid-anhydride unit in an electro-conductivity applying agent and the (E) molecule around a conductive shaft, and is obtained.
[0006] The thing which the alkenyl radical in which a hydrosilylation reaction is possible comes to contain at the molecule end as a polymer of the aforementioned (A) component is desirable, as for the number average molecular weight of the polymer of the (A) component, it is desirable that it is within the limits of 1000-50000, and its oxypropylene system polymer which has in a molecule the alkenyl radical in which at least one hydrosilylation reaction is possible as a (A) component is desirable.
[0007] The polyorgano hydrogen siloxane which contains at least two hydrosilyl radicals in 1 molecule on the average as a compound which has a hydrosilyl radical in the molecule of the aforementioned (B) component is desirable.
[0008] As an electro-conductivity applying agent of the aforementioned (D) component, carbon black is used suitably. Into the molecule of the aforementioned (E) component, as a compound containing at least one acid-anhydride unit, it is desirable that number average molecular weight is 2000 or more, and a maleic-anhydride-isobutylene system copolymer and/or a maleic-anhydride-allyl compound end polyoxyalkylene series copolymer can be used suitably.
[0009] In the conductive roller manufactured in this invention, the enveloping layer of a monolayer or a double layer may be prepared in the outside of this conductive rubber elastic layer, and a urethane resin system constituent can be suitably used as a resin constituent which constitutes an enveloping layer. Said enveloping layer can be prepared by applying the solution of the resin constituent which constitutes an enveloping layer from on a conductive rubber elastic layer. As for the temperature at the time of drying the applied resin constituent solution, it is desirable that it is 70-200 degrees C. Moreover, as for the thickness of the enveloping layer obtained after desiccation, it is desirable that it is 1-100 micrometers. Moreover, it is desirable that the solvent of the solution of the resin constituent which constitutes an enveloping layer is what contains N,N-dimethylformamide and/or N,N-dimethylacetamide a total of 10% of the weight or more.
[0010]
[Embodiment of the Invention] The (A) component used for this invention is an oxy-alkylene system polymer which has in a molecule the alkenyl radical in which at least one hydrosilylation reaction is possible.
[0011] Here, it will not be restricted especially if an alkenyl radical is a radical including carbon-carbon duplex association which has activity to a hydrosilylation reaction. As an alkenyl radical, ring type unsaturated hydrocarbon radicals, such as aliphatic series partial saturation hydrocarbon groups, such as a vinyl group, an allyl group, a methylvinyl radical, a propenyl radical, a butenyl group, a pentenyl radical, and a hexenyl radical, a cyclo propenyl radical, a cyclo butenyl group, a cyclo pentenyl radical, and a cyclohexenyl group, an methacrylic radical, etc. are mentioned. (A) Although the number of the alkenyl radicals of the oxy-alkylene system polymer

of a component is required in order [at least one] to carry out a hydrosilylation reaction with the (B) component which is a curing agent, in the case of the molecule which has two alkenyl radicals in the both ends of a molecule from a viewpoint which obtains good rubber elasticity in the case of a straight chain molecule, and has branching, it is desirable to have two or more alkenyl radicals at the molecule end. As for the (A) component in this invention, it is desirable to introduce into the polymer end the alkenyl radical in which the above-mentioned hydrosilylation reaction is possible. Thus, when an alkenyl radical is in a polymer end, it is desirable from points, like the roller which has the rubber elastic layer of a low degree of hardness and high intensity becomes is easy to be obtained.
[0012] Here, although the approach of introducing an alkenyl radical into an end, a principal chain, or a side chain by making the organic compound which has the active group and alkenyl radical which show reactivity to an end a principal chain, or a side chain to the above-mentioned functional group as an approach of introducing an alkenyl radical into a polymer at the organic polymer which has functional groups, such as a hydroxyl group and an alkoxide radical, for example react is mentioned, it is not necessarily limited to this, moreover, as an example of the organic compound which has the active group and alkenyl radical which show reactivity to the above-mentioned functional group The unsaturated fatty acid of C3-C20, such as an acrylic acid, a methacrylic acid, a vinyl acetic acid, acrylic-acid chloride, and an acrylic-acid star's picture, Acid halide, an acid anhydride, etc. and allyl compound chloro formate ($CH_2=CHCH_2OCOCl$), The unsaturated fatty acid permutation carbonic acid halide of C3-C20, such as allyl compound BUROMO formate ($CH_2=CHCH_2OCOBr$), An allyl chloride, an allyl compound star's picture, vinyl (chloro methyl) benzene, Allyl compound (chloro methyl) benzene, allyl compound (bromomethyl) benzene, The allyl compound (chloro methyl) ether, allyl compound (chloro methoxy) benzene, 1-butenyl (chloro methyl) ether, 1-hexenyl (chloro methoxy) benzene, allyloxy (chloro methyl) benzene, etc. are mentioned.
[0013] As a unit which 50% or more says the polymer which consists of an oxy-alkylene unit, and contains in addition to an oxy-alkylene unit, the unit from the compound which is used as starting material at the time of polymer manufacture and which has two or more active hydrogen, for example, ethylene glycol, a bisphenol system compound, a glycerol, trimethylol propane, pentaerythritol, etc. is mentioned preferably 30% or more of the unit from which the oxy-alkylene system polymer in this invention constitutes a principal chain. In this invention, an oxypropylene system polymer is especially mentioned as a desirable polymer from the point of availability etc. In addition, you may be a copolymer (a graft polymer is also included) with the unit which consists of ethylene oxide, butylene oxide, etc. in the case of an oxypropylene system polymer.
[0014] As molecular weight of the oxy-alkylene system polymer of the above (A) components, it is desirable that it is 5000-30000 at 1000-50000, and a pan in the viewpoint received the balance of reactivity and the reduction in a degree of hardness to number average molecular weight (Mn). When number average molecular weight is less than 1000, and this hardenability constituent is stiffened, sufficient mechanical property (a rubber degree of hardness, elongation percentage) etc. becomes is hard to be acquired. It is in the inclination for hardening to become inadequate in many cases in order that the molecular weight per alkenyl radical contained in a molecule when number average molecular weight becomes not much large on the other hand too much may become large or reactivity may fall by steric hindrance, and for viscosity to become high too much, and for workability to worsen. The number average molecular weight in this invention can usually be obtained as a polystyrene reduced property by GPC measurement by the polystyrene gel column which used chloroform as a mobile phase.
[0015] If the (B) component in this invention is used as a curing agent and contains two or more hydrosilyl radicals in intramolecular, there will be no limit. Here, in this invention, although the radical which has Si-H association is expressed as a hydrosilyl radical, when two hydrogen atoms (H) have combined with the same silicon atom (Si), it calculates with two hydrosilyl radicals.
[0016] (B) As a component, although a polyorgano hydrogen siloxane is desirable, it is mentioned as one. The polyorgano hydrogen siloxane said here points out the siloxane compound which has a hydrocarbon group or a hydrogen atom on a silicon atom. It is [0017] when the structure is shown concretely.
[Formula 1]

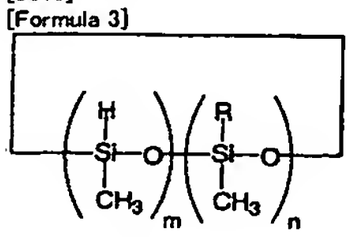


(As 2<m+n<=50, 2<m, 0<=n, and R, the carbon number of a principal chain may contain one or more phenyl groups with the hydrocarbon of 2-20.)

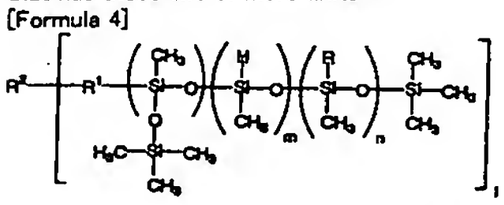
[0018]
[Formula 2]



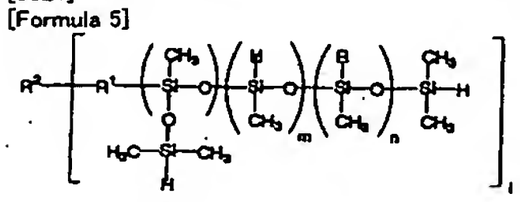
(As 0<m+n<=50, 0<m, 0<=n, and R, the carbon number of a principal chain may contain one or more phenyl groups with the hydrocarbon of 2-20.)
[0019]
[Formula 3]



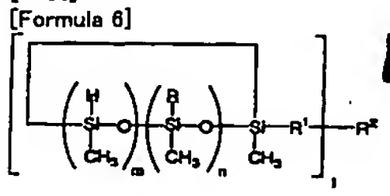
(As 3 <=m+n<=20, 2< m<=19, 0<=n<18, and R, the carbon number of a principal chain may contain one or more phenyl groups with the hydrocarbon of 2-20.) etc. -- the shape of a chain shown, an annular thing, and [0020] that has these two or more units
[Formula 4]



(As 1 <=m+n<=50, 1<=m, 0<=n, and R, the carbon number of a principal chain may contain one or more phenyl groups with the hydrocarbon of 2-20.) 2<=l and R2 are the organic radicals of 2 - tetravalence, and R1 is a divalent organic radical. However, R1 may not be depending on the structure of R2.
[0021]
[Formula 5]

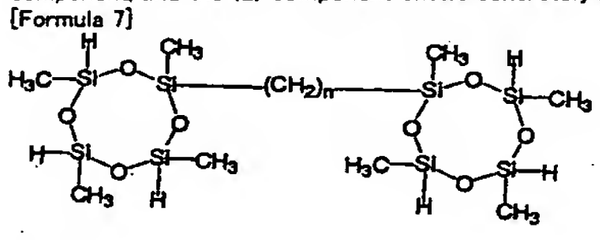


(As 0 <=m+n<=50, 0<=m, 0<=n, and R, the carbon number of a principal chain may contain one or more phenyl groups with the hydrocarbon of 2-20.) 2<=l and R2 are the organic radicals of 2 - tetravalence, and R1 is a divalent organic radical. However, R1 may not be depending on the structure of R2.
[0022]
[Formula 6]

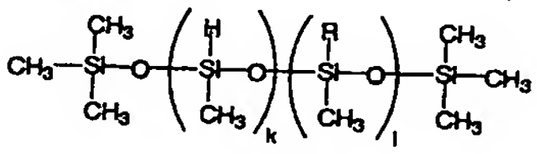


(As 3 <=m+n<=50, 1<=m, 0<=n, and R, the carbon number of a principal chain may contain one or more phenyl groups with the hydrocarbon of 2-20.) 2<=l and R2 are the organic radicals of 2 - tetravalence, and R1 is a

divalent organic radical. however, R1 may not be depending on the structure of R2. etc. -- what is shown is mentioned.
[0023] Moreover, if in charge of use of these (B) components, what has good compatibility with the (A) component, the (C) component, the (D) component, and the (E) component or the distributed stability in a system is desirable. When especially the viscosity of the whole system is low and what has compatibility low as (B) component with each above-mentioned component is used, phase separation happens and poor hardening may be caused.
[0024] (A) It is [0025] when compatibility or distributed stability with a component, the (C) component, the (D) component, and the (E) component shows concretely as a comparatively good thing.
[Formula 7]



(n is 6-12)
[0026]
[Formula 8]



(2< k<30, 0< l<10, and R are a with a carbon numbers of eight or more hydrocarbon group) etc. -- it is mentioned.
[0027] Moreover, it is desirable to use it to the total amount of the alkenyl radical of the (A) component, as amount of the (B) component used in this invention, so that the hydrosilyl radical of the (B) component may become 0.8-5.0Eq. It may become inadequate constructing a bridge, when the hydrosilyl radical of the (B) component does not fulfill 0.8Eq to the alkenyl radical total amount of the above-mentioned (A) component. Moreover, in exceeding 5.0Eq, it poses a problem that physical properties change with the effects of the hydrosilyl radical which remains after hardening a lot. It is desirable to use the (B) component so that it may become 0.9-2.0Eq to control especially this effect.
[0028] About the hydrosilylation catalyst which is the (C) component of this invention, there is especially no lim and it can use the thing of arbitration. the thing; platinum-vinyl siloxane complex which made support, such as chloroplatinic acid, a simple substance of platinum, an alumina, a silica, and carbon black, support solid-state platinum when illustrating concretely -- {-- for example Ptn(ViMe2SiOSiMe2Vi) n and a Pt[(MeViSiO)4] m}; platinum-phosphine complex -- {-- for example a Pt (PPh3)4 and Pt(PBu3)4}; platinum-phosphite complex -- {-- for example Pt[P(OPh)3] 4 and Pt[P(OBu) 3]4] (the inside of a formula, and Me -- a methyl group --) In Bu, butyl and Vi express a vinyl group, Ph expresses a phenyl group, and n and m express an integer. The platinum alcoholate catalyst indicated in Lamoreaux's and others U.S. Pat. No. 3220972 specification is also mentioned to the platinum-hydrocarbon complex indicated in Pt (acac)2, Ashby's and others United States patent 3159601st, and a No. 3159662 specification, and a list.
[0029] Moreover, as an example of catalysts other than a platinum compound, RhCl (PPh3)3, RhCl3, Rh/aluminum 2O3, RuCl3, IrCl3, FeCl3 and AlCl3, PdCl2.2H2O, NiCl2, TiCl4, etc. are mentioned. These catalysts may be used independently, and even if it uses two or more sorts together, they are not cared about. Chloroplatinic acid, a platinum-olefin complex, a platinum-vinyl siloxane complex, and Pt(acac)2 grade are desirable from the point of catalytic activity.
[0030] (C) Although there is especially no limit as an amount of catalysts of a component, it is good to use in the range of 10-1 to ten to 8 mol to one mol of alkenyl radicals in the (A) component. It is good to use in the range of 10-2 to ten to 6 mol preferably. Moreover, it is better not to use ten - one or more mols, since a hydrosilylation catalyst is generally expensive, and it is corrosive, and hydrogen gas is generated in large quantities and a hardened material may foam.

[0031] The electro-conductivity applying agent which is the (D) component in this invention is a component which gives conductivity to the roller manufactured using the constituent of this invention, or the constituent of this invention. As an electro-conductivity applying agent of a component, (D) Carbon black, a metallic oxide, Metal impalpable powder, an alkali-metal salt, quarternary ammonium salt, a carboxylic-acid radical, The organic compound or polymer which has a sulfonic group, a sulfate radical, a phosphoric ester radical, etc., Ether ester imide or an ether imide polymer, an ethyleneoxide-epihalohydrin copolymer, Compounds, such as an antistatic agent of high molecular compounds, such as a compound which has the conductive unit represented with methoxy polyethylene-glycol acrylate etc., or a polyethylene-glycol derivative, etc. are mentioned.
[0032] As an example of the above-mentioned carbon black, furnace black, acetylene black, lamp black, channel black, thermal black, oil black, etc. are mentioned. There is no limit in the class of these carbon black, particle size, etc.
[0033] Here, since a hydrosilylation reaction may be checked depending on the class and addition of an electro-conductivity applying agent, it is desirable that the effect to a hydrosilylation reaction uses few electro-conductivity applying agents. (D) the addition of a component is adjusted and added according to a desired electric conduction property (roller resistance) — having — the polymer 100 weight section of the (A) component — receiving — further 5 - **** for the 1 - 100 weight section and 50 weight sections — things are desirable. When the electric conduction grant ability which will be obtained if there are too few additions is inadequate and there are too many additions, there is a possibility that it may become large bad going up [of viscosity] workability. Here, the roller resistance in this invention applies a roller at a level with a metal plate, and adds a 500g load to each of the both ends of the conductive shaft of a roller in the direction of a metal plate, and the electric resistance value measured by impressing the direct current voltage of 10-100 volts between a shaft and a metal plate is said.
[0034] In case the compound which has at least one acid-anhydride unit in the molecule which is the (E) component of this invention forms the enveloping layer of the conductive roller manufactured by this invention, it is a component for reducing the often generated odor. When the N,N-dimethylformamide used as a suitable solvent of the urethane resin preferably used as a principal component of an enveloping layer concretely [the odor considered to be based on the solvent reason used as above-mentioned when forming an enveloping layer may become a problem, and] was used, the odor after desiccation often became a problem. As a cause of this odor, although it is not clear for details, after desiccation is considered to be based on the amine system compound which it is decomposed or returned and the solvent which remains in the minute amount, or a solvent generates under the effect of heat etc. In this invention, it is thought that an acid anhydride supplements with said amine compound etc. effectively.
[0035] As a (E) component of this invention, if at least one acid-anhydride unit is contained in a molecule, there is especially no limit and it can use the usual organic compound or a polymer. In this invention, a maleic-anhydride and maleic-anhydride-isobutylene system copolymer, a maleic-anhydride-styrene system copolymer, a maleic-anhydride-allyl compound end polyoxyalkylene series copolymer, phthalic anhydride, methyl cyclohexene-dicarboxylic anhydride, hexahydro phthalic anhydride, the Pori adipic-acid anhydride, tetrahydro phthalic anhydride, and ethylene glycol bis(trimellitate) are illustrated. Especially, it is liquefied, and is easy to handle, and compatibility with the (A) component which is matrix resin can use suitably a maleic-anhydride-isobutylene system copolymer and a maleic-anhydride-allyl compound end polyoxyalkylene series copolymer from a good point. (E) As for the molecular weight of a component, it is desirable that it is 2000 or more. (E) The addition of a component has desirable 0.01 - 50 weight section to the (A) component 100 weight section, and its 0.1 - 20 weight section is still more desirable. When there are too few additions, there is a possibility that sufficient effectiveness may no longer be acquired. Moreover, when there are too many additions, there is a possibility that the acid-anhydride part the part carried out [the part] ring breakage may become causes, such as foaming at the time of hardening.
[0036] In this invention, it is adding the (E) component, and in reducing the odor generated in case the enveloping layer of the conductive rubber elastic layer formed from (A) - (E) component of a conductive roller is formed and using nitrogen-containing atom system solvents, such as N,N-dimethylformamide, as a solvent of an enveloping layer especially, it discovers the very big odor reduction effectiveness.
[0037] Moreover, to the constituent of this invention, the adhesive grant agent for raising the adhesive property over various base materials and adhesive grant resin can be added if needed. As an example of an adhesive grant agent, various silane coupling agents, an epoxy resin, etc. are mentioned. The effect of especially the silane coupling agent that has functional groups, such as an epoxy group, a methacryloyl radical, and a vinyl group, affect the hardenability of a constituent is also small, and it is easy to use effectiveness also for an adhesive manifestation greatly. However, the silane coupling agent which can be used is not limited to these. Moreover, it can use together with a silane coupling agent or an epoxy resin, and these reaction catalysts can be added.

[0044] Under the present circumstances, in order to improve the coat nature of an enveloping layer solution, various additives, such as a leveling agent, may be added if needed. The conductive roller in this invention may prepare an unit or two or more enveloping layers in the outside of a conductive rubber elastic layer if needed. The conductive roller of this invention is suitable for the concrete for example, electrification roller for electrophotography equipments, a developing roller, an imprint roller, a middle imprint drum, a feed roller, a cleaning roller, the pressurization roller for fixing, etc.

[Translation done.]

Moreover, there is especially no limitation in adhesive grant resin, and it can usually use what is used as a tackifier for it. As an example, phenol resin, denaturation phenol resin, cyclopentadiene-phenol resin, xylene resin, cumarone resin, petroleum resin, terpene resin, terpene phenol resin, rosin ester resin, etc. are mentioned In addition, if in charge of these use, the effect to a hydrosilylation reaction must be taken into consideration. Moreover, to the constituent of this invention, an antioxidant, an ultraviolet ray absorbent, a pigment, etc. may be added suitably.
[0038] Moreover, a storage stability amelioration agent can be used for the constituent of this invention in order to improve storage stability. It is not limited especially that to be the usual stabilizer known as a preservation stabilizer of the (B) component of this invention as this storage stability amelioration agent, and what is necessary is just what attains the desired end. Specifically, the compound containing an aliphatic series unsaturated bond, an organic phosphorous compound, an organosulfur compound, a nitrogen content compound, a tin system compound, organic peroxide, etc. can be used suitably. Still more specifically 2-benzothiazolyl sulfide, benzothiazole, A thiazole, dimethyl acetylene die carboxylate, diethyl acetylene die carboxylate, Butylhydroxytoluene, burylhydroxyanisole, vitamin E, 2-(4-mol FOJI nil dithio) benzothiazole, 3-methyl-1-butene-3-oar, An acetylene nature partial saturation radical content ORGANO siloxane, an ethylene nature partial saturation radical content ORGANO siloxane, Although acetylene alcohol, 3-methyl-1-butyl-3-oar, dially fumarate, diallyl malete, diethylfumarate, diethyl malate, dimethylmalate, 2-pentene nitril, 2, and 3-dichloropropene etc. is mentioned It is not necessarily limited to these.
[0039] Especially the manufacture approach of the conductive roller in this invention is not limited, but the shaping approach of various well-known rollers can be conventionally used for it. For example, a constituent is fabricated to the metal mold which installed metal shafts, such as a product made from SUS, in the core by the various fabricating methods, such as extrusion molding, press forming, injection molding, reaction injection molding, liquefied injection molding, and cast molding, heat hardening is carried out to it by suitable temperature and time amount, and a conductive rubber elastic layer is formed in the surroundings of a conductive shaft. Hen as a conductive shaft in this invention, the thing of a sleeve configuration in the air can also be used. Since the constituent for forming an elastic layer is liquefied as the manufacture approach of the conductive roller in this invention, liquefied injection molding is desirable in respect of productivity and workability. In this case, after carrying out semi-hardening of the conductive constituent, it may establish and carry out full hardening of the process which carries out postcure separately.
[0040] The constituent of this invention is hardened by the addition reaction of the Si-H radical to the alkenyl radical which used the precious metal catalyst. Therefore, a cure rate is very quick, and it is convenient when performing Rhine production. The temperature to which heat curing of the constituent of this invention is carrie out has desirable within the limits of 80 degrees C - 180 degrees C. If it becomes 80 degrees C or more, a hydrosilylation reaction can advance rapidly and it can be made to harden by short time amount.
[0041] Next, the enveloping layer prepared in the outside of the conductive rubber elastic layer of the conductive roller in this invention is explained.
[0042] As a concrete resin constituent of an enveloping layer, although there is especially no limit, a urethane bond is contained from a viewpoint of an electric conduction property and abrasion resistance. From viewpoints such as flexibility, that what is necessary is just to consist of a urethane resin constituent which considers a polyether, polyester, and the resin that has a polycarbonate frame as the main presentations Moreover, urethan resin, You may be a urethane resin constituent containing at least one frame chosen in the group which consist of a urethane bond, a polyether, polyester, a polycarbonate, and a polysiloxane into a polyether, polyester, blend resin with a polycarbonate, and 1 molecule. Moreover, to the resin constituent which constitutes an enveloping layer, an electro-conductivity applying agent, various fillers, or the various additives of a silane coupling agent may be added if needed from viewpoints, such as an adhesive property over resistance adjustment, surface type-like adjustment, or a conductive elastic layer.
[0043] Next, the formation approach of the enveloping layer in this invention is explained. Although there is especially no limit as the formation approach of the enveloping layer in this invention, the enveloping layer of thi conductive rubber elastic layer can be formed by applying to predetermined thickness the resin constituent which constitutes an enveloping layer using the approach of a spray coating cloth, DIP spreading, a roll coat, etc., and making it dry and harden at predetermined temperature from on a conductive rubber elastic layer. The resin used as the above-mentioned enveloping layer is specifically melted to a solvent, solid content is made 5 - 20%, and a spray or the approach of carrying out dipping spreading is simple. If the resin which is the principal component of an enveloping layer used as a solvent to be used dissolves, there will be especially no limit and, specifically, a methyl ethyl ketone, butyl acetate, ethyl acetate, N,N-dimethylformamide, N,N-dimethylacetamide toluene, etc. will be illustrated. When forming an enveloping layer especially using urethane resin, N,N-dimethylformamide and N,N-dimethylacetamide are desirable from a viewpoint of compatibility.

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EXAMPLE

[Example] Although this invention is further explained to a detail based on the following examples, this invention is not limited only to these examples.
Stinking thing quality evaluation: Qualitative evaluation of stinking thing existence was performed about what pu the created roller into the plastics bag of 320mmx400mm, and left it at the room temperature with the nitrogen of 3L for 24 hours, and what O and an odor are sensed as in what an odor is not sensed as was estimated as x. Smell evaluation by the stinking sensor: It evaluated using stinking sensor XP-329N (product made from new cosmos electrical machinery) about what put the created roller into the plastics bag of 320mmx400mm, and left it at the room temperature with the nitrogen of 3L for 24 hours.
As opposed to allyl compound end polyoxypropylene (trade name ACX004-N, Kaneka make) 500g as a (A) component (Example 1) (D) Into the mixture kneaded with 3 rolls as a component, carbon black #3030B (Mitsubishi Chemical make)70g subsequently (E) As a component a maleic-anhydride-allyl compound end polyoxyalkylene series copolymer (made in [Nippon Oil & Fats] trade name Maria Lim AKM0531) 5g, (B) As a component a polyorgano hydrogen siloxane (trade name ACX004-C, Kaneka make) as 33g and a (C) component As 350microL and a storage stability amelioration agent, 170microL **** of the dimethylmalate was carried out, and homogeneity mixing of the bis(1, 3-divinyl - 1, 1, 3, and 3-tetramethyl disiloxane) platinum complex compound catalyst (platinum content 3wt% and xylene solution) was carried out. The conductive constituent obtained in this constituent after vacuum degassing churning equipment (product made from C Tech) performec the indirect desulfurization bubble for 90 minutes was poured into the roller molding die by injection pressure 1MPa, and ten semi-conductive rollers which prepared the semi-conductive elastic layer with 3mm [in thickness] and a die length of 230mm in the surroundings of the shaft with a diameter of 8mm made from SUS on the conditions of 20-minute heating by 150 degrees C were created.
[0046] Next, how to create an enveloping layer about the created roller is described. It dissolves in 450g (N,N-dimethylformamide) of solvents, and applies by the dipping method, and at 150 degrees C, 50g (trade name high MUREN Y237) of polyether system urethane resin was heated for 60 minutes, and it was dried. Thus, the result of having performed the above-mentioned smell evaluation about the created roller was shown in Table 1.
(Example 2) About the formula of example 1 publication, the rest created the roller similarly, having used the maleic-anhydride-allyl compound end polyoxyalkylene series copolymer (made in [Nippon Oil & Fats] trade name Maria Lim AFB1521) as a (E) component, and having used the addition as 10g. Furthermore, the result of having formed the enveloping layer by the approach of example 1 publication similarly, and having performed the above-mentioned smell evaluation about the obtained roller was shown in Table 1.
(Example 3) About the formula of example 1 publication, the rest created the roller similarly, having used the maleic-anhydride-allyl compound end polyoxyalkylene series copolymer (made in [Nippon Oil & Fats] trade name Maria Lim AAB0851) as a (E) component, and having used the addition as 10g. Furthermore, the result of having formed the enveloping layer by the approach of example 1 publication similarly, and having performed the above-mentioned smell evaluation about the obtained roller was shown in Table 1.
(Example of a comparison) About the conductive roller given in an example, the rest added the conductive roller by the same approach, without adding the (E) component. Still the more nearly same, by the approach of example 1 publication, the clothing layer was formed and the result of having performed the above-mentioned smell evaluation about the obtained roller was shown in Table 1.
[0047]
[Table 1]

	実施例1	実施例2	実施例3	比較例
定性試験	○	○	○	×
臭いセンサー測定値	187	133	191	360

As shown above, in case the enveloping layer of a conductive roller is formed, according to this invention, it becomes possible to reduce the often generated odor.
[0048]

[Translation done.]